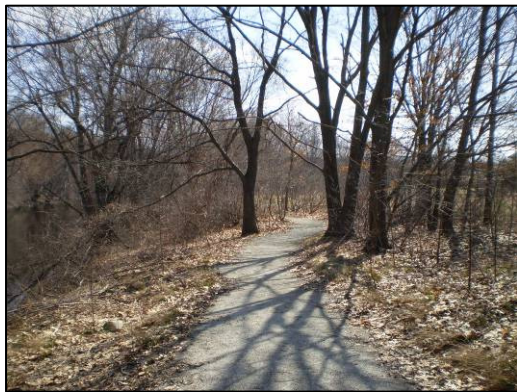


**Alternative 3 - Reroute the BFRT to behind Concord Park Assisted Living Facility**

The Assabet River flows at the eastern limits of the Concord Park Assisted Living Facility. After the BFRT crosses the Nashoba Brook structure, the trail could bend easterly and follow the Assabet River behind the facility. There is an existing stone dust path at the rear of the facility property and a small slightly wooded area separating the property from the river. There is a sitting area with some benches at the northern end of the stone dust path. It is our understanding that Concord Park has concerns about incorporating the bike trail with the stone dust trail on the property and the desire is to keep them separate. Concord Park is an assisted and independent living senior community so the concern lies with possible conflict between high speed cyclists and elderly residents.



The right of way behind Concord Park is owned by VOA Concord Assisted Living Inc. The right-of-way between the MBTA Bridge and Main Street is owned by A&D Real Estate LLC. The MBTA right-of-way is approximately sixty-six (66) feet in width. The rail track bed is approximately twenty-five (25) feet in width.

Consideration was given to incorporating the bike trail into the existing rail bridge over the Assabet River. A letter was sent by the Town of Concord to the MBTA on April 13, 2009 requesting that the MBTA include a walkway along the MBTA's track east of West Concord station and the crossing of the Assabet River adjacent to the Fitchburg Mine Line tracks. The MBTA's response indicated that the right of way width in this area was insufficient to provide the safe separation necessary for the MBTA's trains and a path. Therefore, incorporating the bike trail into the existing rail bed would not be acceptable to the MBTA. MBTA's response letter dated May 13, 2009 has been included on the following page.

The Assabet River was designated a Wild and Scenic River in 1999 with ecology, archaeology and history, scenic, recreation and literary resources being identified as the “outstandingly remarkable values”. The Wild and Scenic Rivers Act prohibits any department or agency of the United States from assisting in the construction of any water resources project that would have a “direct and adverse” effect on the values for which the river was established and it precludes federal assistance to projects below/above a designated river that have been determined to “invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present...as of the date of designation”. The River Stewardship Council (RSC) was established to coordinate conservation of the river. They function as an advisory committee to the National



## **Massachusetts Bay Transportation Authority**

*Deval L. Patrick*  
Governor

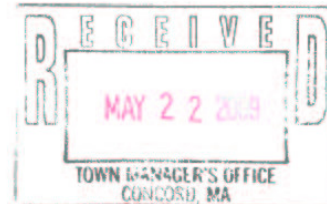
*Timothy P. Murray*  
Lt. Governor

*James A. Aloisi, Jr.*  
Secretary and MBTA Chairman

*Daniel A. Grabauskas*  
General Manager

May 13, 2009

Mr. Gregory P. Howes  
Chair  
Town of Concord  
Board of Selectman  
22 Monument Square  
PO Box 535  
Concord, MA 01742



Dear Mr. Howes:

I am writing in response to your letter of April 13, 2009 requesting the MBTA include a walkway along the MBTA's track east of the West Concord station and the crossing of the Assabet River adjacent to our Fitchburg Main Line tracks. The MBTA firmly believes in the benefits of transit oriented development and we are always looking for ways to make such proposals successful.

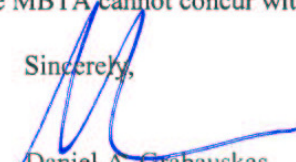
Your request is compelling but our review of the available right of way width in this specific area is insufficient to provide the safe separation necessary for the MBTA's trains and a path. This type of access/usage over an active MBTA railroad bridge is not allowed anywhere on our system. Your proposal would place the public extremely close to trains passing in excess of 60 MPH. Debris and ice can be kicked up by a passing train, causing a dangerous situation. The movement of the bridge during train passage would also be startling to bikers or walkers.

The cost to protect pathway users from these occurrences could not be justified when the alternative existing path of travel is relatively close in travel time. By our rough calculation, the distance of the existing route between the West Concord station and the Baker Avenue grade crossing is 1814 feet with the route along the tracks being just 258 feet shorter.

Should you wish to reconsider the separate pedestrian/bike bridge away from the railroad bridge the MBTA would gladly work with the Board of Selectmen to provide a proper connection to the MBTA's station platforms, just as we have with the Bruce Freeman Rail Trail routing through the parking lot and across the tracks at the protected Commonwealth Avenue grade crossing.

After careful consideration, I regret that the MBTA cannot concur with your request.

Sincerely,



Daniel A. Grabauskas  
General Manager

***Driven by Customer Service***

Massachusetts Bay Transportation Authority, Ten Park Plaza, Boston, MA 02116-3974



Park Service (NPS) on federal permits affecting the rivers' outstanding resources. Any work would need to be reviewed by the RSC. Since they are not a permitting agency, they review projects through the Army Corps of Engineers PGP II application to determine if any project within a quarter mile of the designated river has a direct and adverse impact. They review plans and offer comments.

### ***Alternative 3A - Tunnel under the MBTA Rail Line***



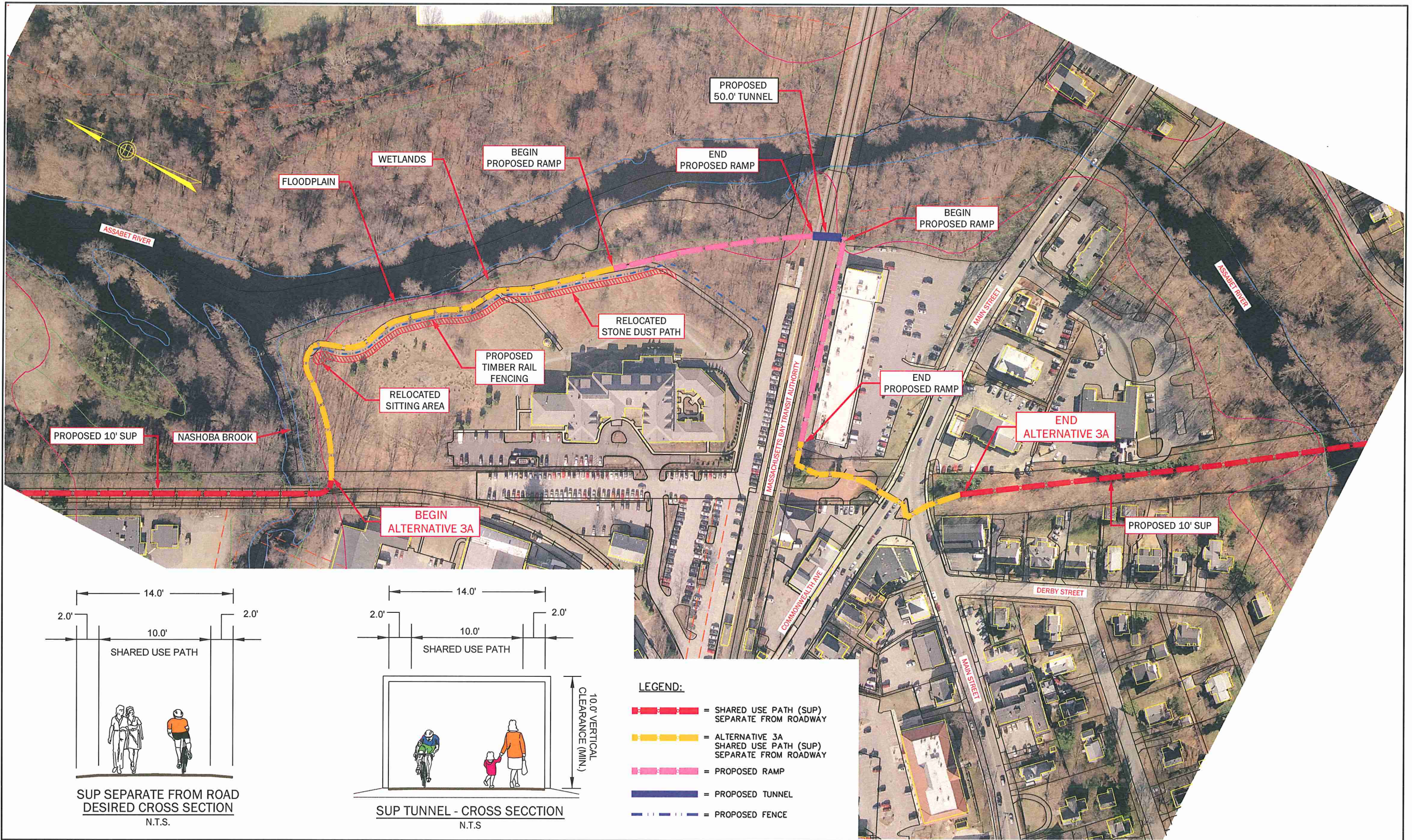
This alternative would require tunneling under the active rail line. A meeting with the MBTA and DPU on July 13, 2009 indicated that they did not have an issue with a tunnel under the tracks if it could be completed without interrupting rail service. With the proximity of the Assabet River, it is assumed that the water table is very high. A tunnel would require an extensive pumping system both during and after construction. Prior to furthering this design, borings must be performed to determine the exact location of the water table, the subsurface soil and whether or not there is ledge.

The MassDOT *Guide* requires a ten foot vertical clearance for underpasses and tunnels. The *Guide* also requires a two (2) foot wide clear shoulder on either side of the trail through the tunnel which would require a fourteen (14) foot wide tunnel. GPI would propose a reinforced concrete box tunnel. With a fourteen (14) foot width, the required wall thicknesses would be between twelve (12) inches and eighteen (18) inches. In order to install the tunnel without suspending train service, the tunnel would need to be between six (6) and eight (8) feet under the bottom of the tracks making the trail elevation in the tunnel between seventeen (17) and nineteen (19) feet under the bottom of the tracks. At a depth of six (6) to eight (8) feet under the tracks, the tunnel could be jacked straight through with no additional support required for the tracks. If the tunnel was shallower than six (6) to eight (8) feet under the tracks, train service would need to be suspended in order to place a temporary frame and brace the tracks. However, jacking the tunnel is only a feasible solution if there is no ledge removal required.

For ADA compliance, the maximum slope for the proposed trail is 5%. The grade can be increased to 8.33%; however, level landings would be required every thirty (30) feet. Therefore, in order to install a tunnel between seventeen (17) and nineteen (19) feet under the active rail line, the ramps down to reach that elevation would be between three hundred and forty (340) and three hundred and eighty (380) feet in length at a 5% grade. The actual tunnel would be approximately fifty (50) feet in length. Railing and retaining walls would be necessary on the ramps descending and ascending from the tunnel.

The distance between the MBTA Bridge and Main Street varies between three hundred (300) and four hundred (400) feet and does not provide sufficient distance for the tunnel to surface before Main Street. The elevation difference from the existing ground in that location to the parking area of the West Concord Shopping Plaza is in excess of ten (10) feet. If a tunnel system were proposed, after crossing under the tracks the tunnel would need to take a 90° turn to begin climbing back up to existing ground requiring trail users to dismount their bicycles. See Figure 7 on the following page. This provides a sight distance issue and does not meet the minimum radius requirements in the *Guide*. With a sharp turn, a blind corner is created and the potential for trail user collision is greatly increased. This would require the posting of warning signs alerting trail users to the sharp turn and requiring that they dismount and walk their bikes. Although a switch





ALTERNATIVE 3A - CONCEPTUAL PLAN  
REROUTE BFRt BEHIND CONCORD PARK  
CONCORD, MA

FIGURE 7

SCALE: 1" = 80'



back ramp system could fit in this location between the MBTA tracks and Main Street, the option was not investigated further due to the presence of floodplain and the difference in elevation from the land abutting the Assabet River where the tunnel would surface and the parking area at West Concord Shopping Plaza.

This ramp system would run parallel to the track behind the businesses in a westerly direction and reach ground level at the westerly end of the West Concord Shopping Plaza. The paved area behind the buildings varies between fifteen (15) and twenty (20) feet and the businesses currently use that area to load/unload and as a back entrance to their buildings. At the edge of the paved area the ground begins to climb to the tracks. In order to daylight the tunnel, an easement would be required from A&D Real Estate LLC and would make use of the property behind the businesses for loading and unloading impossible.



Tunnels also provide safety and security issues. Providing long sight lines is a crucial aspect of tunnel design to ensure both perceived and actual safety. People should be able to see the far end of the tunnel when they enter it. A tunnel would isolate trail users and although studies have shown that crime does not increase in tunnels, it is a possibility. (*Rail-Trails and Safe Communities: The Experience on 372 Trails* - Rails-to-Trails Conservancy 1998 and *Evaluation of the Burke-Gilman Trail's Effect on Property Values and*

*Crime* - Seattle Engineering Department, 1987.) In order to remove some of the safety and security concerns, lighting and possibly security cameras would be necessary.

If this option were selected, after the trail surfaced from the tunnel, it would need to be routed through the Concord Station area to the existing crosswalk and traffic signal at Main Street in front of the 99 Restaurant. As mentioned earlier, it would be GPI's recommendation to make intersection modifications to minimize crossing distances and times. The reconfiguration of the intersection to a more traditional "T" intersection with a single crossing of Main Street would

accomplish this goal. This would require right-of-way from the Boston Gas Company who owns a strip of land abutting and east of the EOTC right-of-way between the tracks and Main Street, and from EOTC.

***Alternative 3B - Bridge over the MBTA Rail Line***

This option would bridge over the active rail line. The MBTA requires twenty-two and a half (22.5) feet over the rails, however, with appropriate waivers from the MBTA the clearance can be as low as eighteen (18) feet. The tracks are elevated in this area. They are approximately ten (10) feet higher than the ground just north of the tracks and five (5) feet higher than the ground south of the tracks.



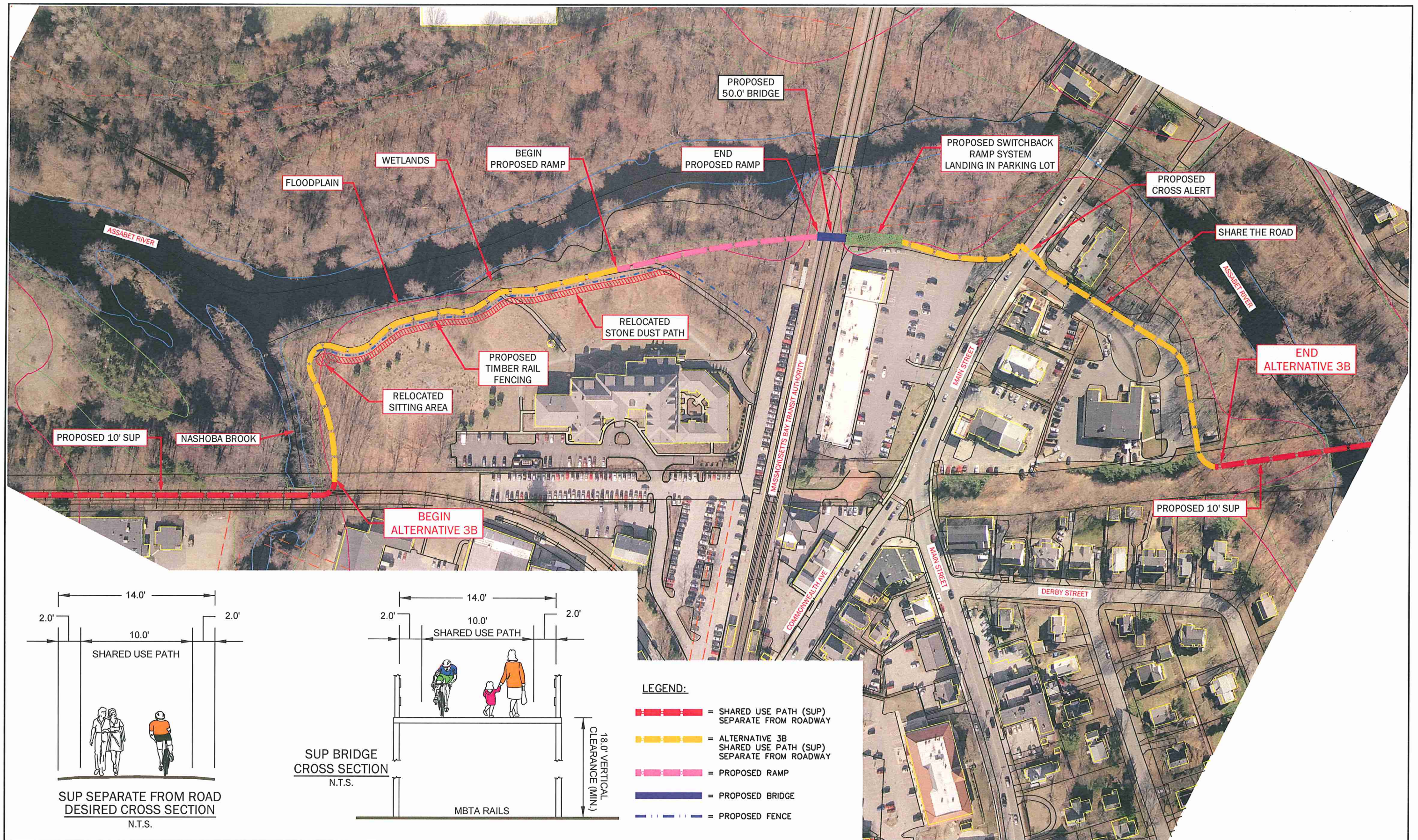
In order to reach eighteen (18) feet above the tracks at a 5% grade, the ramp up headed in a southerly direction would need to be approximately five hundred sixty (560) feet in length and would begin at approximately the center of the Concord Park Facility building. The ramp down would need to be approximately four hundred sixty (460) feet in length to reach existing grade at the parking lot level. There is insufficient distance between the MBTA tracks and Main Street for the ramp to reach existing ground.

Additionally, the parking lot and Main Street are in excess of ten (10) feet above existing ground. Therefore, in order to reach the ground, a switchback ramp system would be necessary requiring users to dismount their bicycles. The structure would be approximately thirty-five (35) feet in height if it was covered with four (4) - one hundred (100) foot ramps with switch backs and a final sixty (60) foot ramp to the existing parking lot. See Figure 8 on the following page. This would require right-of-way from A&D Real Estate LLC and would prohibit use of the parking lot at the eastern side of the West Concord Shopping Plaza. The base of the switch back ramp system would be in the floodplain requiring special design features for support and minimization of impacts.



If this option were selected, the trail would be directed along the eastern limits of the West Concord Shopping Plaza parking area to the existing cross walk on Main Street across from Dunkin Donuts. The existing crosswalk at that location crosses people to the sidewalk in front of Dunkin Donuts. In order to utilize this for the BFRT, the crosswalk must be shifted closer to





ALTERNATIVE 3B - CONCEPTUAL PLAN  
REROUTE BFR BEHIND CONCORD PARK  
CONCORD, MA

FIGURE 8

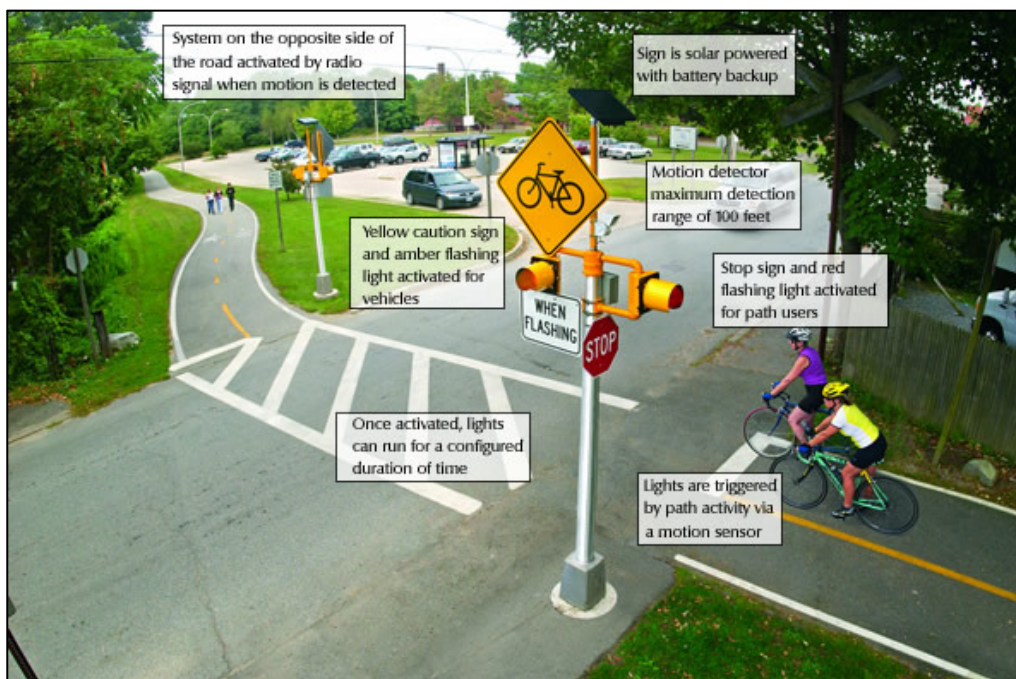
SCALE: 1" = 80'



Westgate Road or to the other corner of the intersection of Main Street with Westgate Road. Typically in situations like this, a Cross Alert system could be proposed to help trail users cross Main Street. However, with the proximity of the Fire Department Emergency Signal, the addition of another signal may be confusing for drivers in which case other design alternatives for this crossing may be necessary including combining the trail crossing/emergency fire signal.



The Cross Alert system provides an advance, active alert to approaching vehicles that path users are at or near the intersection. The Cross Alert system consists of a red LED light and stop sign which are presented to path users and an amber LED light and warning sign which are presented to vehicular traffic. The sign is powered by a solar panel, which is backed up by a battery. The system is activated by path activity via an infrared motion sensor. The companion sign on the other side of the road is activated via radio signal when the first sign detects motion on the path. This system includes an integrated trail counter to provide a count of trail users who cross the intersection.



Once trail users have crossed Main Street they would share Westgate Road which leads to the Concord Car Wash with vehicles. It appears that the area at the end of Westgate Road is also used for parking. There is one driveway entrance to a parking lot at the rear of the Dunkin Donuts. The existing pavement width on Westgate Road appears sufficient to allow for two travel lanes and bicycle accommodations. With the car wash and the parking area provided at the end of Westgate Road it would be our recommendation to keep the trail along the outside edge of the lot. Two crosswalks would be necessary to



accomplish this. One crosswalk would be required at the intersection with Main Street and one crosswalk would be required just south of the Dunkin Donuts parking entrance. Trail users headed south could then cross to the outside edge of the property. Once through the car wash property, the trail would cut through the woods back to the EOTC owned right-of-way before the proposed bridge structure over the Assabet River. From Concord GIS, this property is owned by Mr. Jerome L. Robertson.



### *Alternative 3 Summary*

## **EVALUATION CRITERIA**

### **Effectiveness**

A trail abutting the Assabet River would provide a very scenic location for a trail and most trail users would utilize the trail. However, as with Alternative 1 since human nature is to find the most direct route from Point A to Point B, users may try and find a more direct route, i.e. through the MBTA parking lot and the existing crossing. Fencing may be necessary to prevent this.

Although signing can be proposed requiring bicyclists to dismount their bikes and walk them where sight distance is limited, it will be extremely difficult to enforce without constant monitoring, warnings and possibly enforcement such as police warnings, tickets and fines.

There is also the possibility that public opinion of the tunnel (Alternative 3A) may act as a deterrent for some trail users. The switch back ramp system (Alternative 3B) for the bridge however may force avid trail users to find a more direct route.

### **Short-term and Long-term Reliability**

Alternative 3 provides a continuous, reliable trail both in the short-term and the long-term if it is maintained. Studies have shown that tunnels are generally only closed if there are flooding issues and bridges are only closed for maintenance.

A switch back ramp system will require trail users to dismount and walk their bikes. Although signs would be posted, trail users may not dismount their bikes creating a potentially dangerous situation. Compliance may be low.

### **Short-term and Long-term Maintenance Costs**

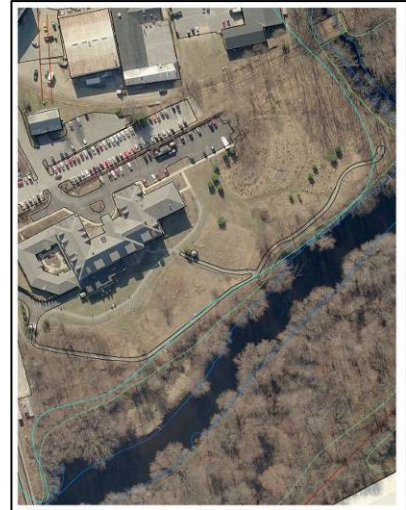
The maintenance costs mentioned earlier in this report apply to this alternative also. The annual maintenance cost for a trail is approximately \$1,500/mile. The long-term paving cost would be approximately \$80,000/mile the first time and \$130,000/mile the second time.



In addition, it should be emphasized that structures must be inspected on a recurring basis. Although this inspection should occur yearly, studies have shown the average inspection interval is four years. Bridges could be constructed with galvanized steel to eliminate the need for periodic painting. However, bridge structures would require periodic maintenance to repair galvanized coating failures, leaking joints, and miscellaneous repairs to chipped walking surfaces or damaged protective screens. Additionally, any lighting or security cameras within the bridge/ramps would require periodic replacement. Boardwalk structures are typically constructed of timber and would require miscellaneous repairs on regular intervals for member replacements and repairs.

### **Difficulty in Implementing**

According to Concord GIS, in addition to the riverfront resource area, the Assabet River has floodplain and wetlands. The extent of the floodplain of the Assabet River varies along its length. Any area within the floodplain would be subject to periodic flooding, therefore if the BFRT was routed through floodplain, it would need to be via a boardwalk structure. Between the Nashoba Brook crossing and the MBTA bridge structure, there would be enough room outside the floodplain limits to shift the stone dust trail closer to the facility and construct the BFRT. This however, would require a substantial amount of right-of-way from the facility. Although two separate paths could be provided, unless fencing was installed there would be no means of insuring that trail users stayed on the trail and off the Concord Park property. Providing fencing would make it much more difficult for facility residents to enjoy the river.



The floodplain and wetlands between the MBTA Rail Bridge and Main Street are extensive and cover most of the area west of the Assabet River. Any structure built through that area would need to be a boardwalk type structure. Compensatory flood storage would need to be provided for all floodplain filled by constructing within the floodplain. There is a thirty foot sewer easement that runs through that area also.

Borings would need to be conducted to determine the subsurface soil information, the location of the water table and the presence of ledge prior to initiating the design of this alternative. In order to reach the required elevations both under and over the active rail line, extensive ramp systems and right-of-way would be required. An easement would be required from the MBTA to cross over or under their facility. Right-of-way would be required from Concord Park for both Alternative 3A and 3B and they would lose access to and views of the Assabet River. Right-of-Way would be required from A&D Real Estate LLC for both alternatives and with the tunnel option they would lose use of all property at the rear of the businesses.

With the proximity of the Assabet River and the floodplain, a high water table and flooding would be a concern. A pumping system would most likely be necessary in a tunnel. A mechanical ventilation system and lighting would be required.



Ventilation would also need to be considered for a bridge structure over the rail line if it were to be enclosed. If the structure was not covered and the BFRT remained open for trail use year round, the bridge would need to be plowed and salted. If a bridge structure was chosen, the preferred option would be an open air structure, with fencing on the sides to prevent objects from falling onto the railroad, and a roof structure to provide snow and rain shelter.

The bridge option would introduce the potential for trail user/motor vehicle contact as users cross Main Street and share the road with vehicles along Westgate Road, vehicles entering the parking lots and the car wash.

Right-of-way would be required, parking would be lost at West Concord Shopping Plaza and the businesses would lose use of the alleyway behind them.

These alternatives may require Design Exceptions since they do not meet the design standards required with respect to sight distance. This would entail the preparation of a Design Exception Report and approval by the Design Exceptions Committee. They would require discussion and/or meetings with both the AAB/ADA Coordinator and the Bicycle/Pedestrian Accommodation Engineer at Mass DOT. At this time, it is unknown whether or not either of these options would be approved by MassDOT. In discussions with MassDOT regarding this report, they had indicated that they would need a formal submission in order to evaluate any alternative and make any decisions. The cost of these alternatives would also weigh in heavily on MassDOT's decision.

It should be noted that the MBTA would support the tunnel option providing MBTA service would not require suspension. This however does make construction more difficult. The MBTA did voice concerns with a bridge structure but have allowed them in the past.

With federal funds being allocated towards the construction of the BFRT, a Categorical Exclusion (CE) Checklist would be required. Since work will be proposed within the Riverfront Area of Nashoba Brook and the Assabet River, a Notice of Intent must be filed with the Concord Natural Resources Commission. It is possible that an Environmental Notification Form (ENF) would also be required assuming that this would be constructed as part of the Concord BFRT and not independently. It should be noted that these permits will be required regardless of this alternative; however, work in the floodplain makes the permitting process much more extensive. An Army Corps of Engineers PGP II Application and coordination with the RSC would be required due to the Wild and Scenic River designation of the Assabet River.

Any work within the floodplain would require contacting the Federal Emergency Management Agency (FEMA). Projects proposed in floodplains are reviewed in conjunction with Massachusetts Environmental Policy Act (MEPA), Massachusetts Wetlands Protection Act, and Massachusetts Office of Coastal Zone Management reviews.

### **Cost to Design and Implement**

The design cost for Alternative 3A would be between \$500,000.00 and \$750,000.00. The design cost for Alternative 3B would be approximately \$500,000.00 to \$600,000.00.

Assuming a concrete tunnel under the MBTA tracks and associated transition to above grade, the construction cost would be between \$5 and \$7 million making the total construction cost of Alternative 3A between \$7 and \$9 million. If rock is encountered, the construction cost could increase by 100% or more depending on the amount of rock removal.



Assuming a steel ramp/bridge structure similar to other MBTA commuter rail locations, the construction cost would also be between \$5 and \$7 million making the total construction cost of Alternative 3B between \$7 and \$9. If additional architectural features were included to improve the structure aesthetics, the total cost could increase by 25% or more depending on the architectural features.

In addition to design and construction costs, construction in a floodplain may make it necessary to get flood insurance in order to obtain construction financing.

### **Risk to Public Safety**

*Rail-Trail Maintenance & Operation* published by the Rails to Trails Conservancy Northeast Regional Office states that approximately a quarter of constructed trails of the 100 trails surveyed reported illegal activities unique to bridges and tunnels including climbing and jumping from bridges, graffiti and vandalism. A tunnel would isolate trail users potentially jeopardizing their safety. The blind corner in the tunnel could present an unsafe condition for trail users who do not dismount their bikes and remain in their travel lane. Switch back ramps do create a potentially hazardous situation for trail users if they do not dismount their bikes due to limited sight distance.



Trail users will be put in potential contact with motor vehicles at the Main Street crossing if Alternative 3A is selected and in the West Concord Shopping Plaza, at the Main Street crossing, along Westgate Road and through the car wash if Alternative 3B is selected.

If fencing was not provided separating Concord Park from the trail, there is potential for bike/pedestrian conflicts.

### **Vehicular Impacts**

Alternative 3A prevents business owners from utilizing the paved area behind their businesses in the West Concord Shopping Plaza for loading and unloading. This alternative also puts trail users in contact with vehicles at the Main Street crossing in front of the 99 Restaurant.

Alternative 3B has vehicular impacts in the parking lot of West Concord Shopping Plaza. It also puts trail users in contact with vehicles at the Main Street crossing, along Westgate Drive and in the car wash/parking area at the end of Westgate Drive.

### **Benefits to the Community**

Routing the trail along the Assabet River would provide a continuous, very scenic route for the BFRT. Both Alternative 3A and Alternative 3B would bring trail users to the businesses in West Concord. Alternative 3B directs trail users to the MBTA Commuter Rail Station.

### **Timeliness to Implement**

Design of a bridge or tunnel requires extensive MassDOT and MBTA review. Right-of-way would be required with both Alternatives 3A and 3B. Depending on the extent of work in the floodplain and wetlands, the permitting process could be extensive.

Assuming the design and construction is completed as part of the BFRT Phase 2C and the abutters are amenable, the design could be completed within 24 to 30 months. The environmental



## FINAL REPORT

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### Proposed Bruce Freeman Rail Trail/MBTA Commuter Rail Crossing Alternative Analysis

permitting could be completed within that time frame. The construction would take approximately 30 to 36 months.

#### Context Sensitive Aesthetics

Although the tunnel option presents an underground alternative, the ramps descending to and ascending from the tunnel create a very large hole in the ground. This hole would detract from the view the Concord Park residents currently have of the Assabet River. A bridge would destroy the residents' view of the Assabet River. The bridge option would also place a very large structure in the village of West Concord.

